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4 International Equity Transactions and U.S. Portfolio Choice

Linda L. Tesar and Ingrid M. Werner

4.1 Introduction

The gain from diversification of investment portfolios across national markets is by now a well-established fact. Studies published in the late 1960s and early 1970s demonstrated that investors would be rewarded for holding a global set of assets rather than skewing their portfolios toward domestic investments (see Grubel 1968; Levy and Sarnat 1970; and Solnik 1974). Since that time, fixed barriers to international investment—such as government controls on cross-border capital flows, difficulties in obtaining information about foreign markets, and differences in financial institutions—have gradually declined. However, as of 1991, the share of portfolio investment allocated to foreign assets by the United States and Canada has remained at less than 5 percent of their total portfolios (Tesar and Werner 1994a). Somewhat surprisingly, the turnover rate on the component of portfolios allocated to international equities is substantially larger than the turnover rate on national equity markets. This suggests that variable transactions costs are unlikely to be the main cause for home bias in portfolio allocations. Therefore models of international portfolio choice must provide explanations *both* for the heterogeneity in national port-

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folios, in particular the bias toward domestic securities, and the high volume of transactions in international securities markets.

To gain further insight into the behavior of international investors, we examine the time-series patterns of bilateral equity flows between five large Organization for Economic Cooperation and Development (OECD) countries: Canada, Germany, Japan, the United Kingdom, and the United States. Our study uses quarterly data drawn from Statistics Canada and the U.S. Department of the Treasury. This research makes a number of contributions to the existing literature on international portfolio investment. First, our data allow us to identify the nationality of the investors involved in cross-border transactions. Thus we are able to study potential differences in investment behavior across investors from different countries. Second, having data on bilateral securities transactions (rather than aggregate portfolio inflows and outflows) allows us to examine how each investor allocates these funds across markets. Finally, our study examines the actual portfolio choice of U.S. investors. Thus we can test models of portfolio choice directly using both the information about asset allocations and returns. Our results suggest that existing models of international portfolio choice are not supported by the data. It is our hope that these findings will help guide the development of new models of portfolio choice that are more consistent with the observed behavior of investors in international equity markets.

In section 4.2 we summarize the rules governing U.S. reporting of international securities transactions. In section 4.3 we examine net equity flows reported by Canadian and U.S. reporting agencies. We find that net equity flows to and from the United Kingdom account for the majority of flows across U.S. borders, while flows to and from the United States account for most of the net equity flows across Canadian borders. In a simple frictionless world, net equity flows result from changes in investors' perceptions about expected returns to, and the risk of, individual markets. If investors across countries shared the same views, one would expect net acquisitions of equity to be synchronized across investors and over markets. We find very little evidence in the data for such a consensus among investors. Perhaps even more puzzling is that net purchases are strongly positively autocorrelated, suggesting that portfolios adjust sluggishly over time. This could be explained by very slow moving state variables driving the perceived investment opportunity set, or by frictions that prevent a rapid adjustment of portfolios in response to altered expectations.

In section 4.4 we construct estimates of U.S. investment positions in foreign equities and foreign investment positions in U.S. equities. During the sample U.S. holdings of foreign equity increased at a modest pace. Foreign holdings of U.S. equity exhibited a more rapid increase and by the end of the sample reached a level of roughly 10 percent of U.S. market capitalization. In section 4.5 we combine these estimates of investment positions with gross transactions volumes to create a measure of turnover in foreign equity. Two basic conclusions emerge. First, gross trading volume in foreign equity is substantially

larger than the corresponding net acquisitions of equity. Second, we find that the rate at which foreign investors turn over their U.S. equity portfolios is roughly at par with the average turnover rate in U.S. markets. In contrast, U.S. investors appear to be trading more frequently on their portfolio of foreign equities, particularly Japanese and British equities, than the average transactions rate on U.S. stock exchanges. U.S. turnover rates in foreign equity also tend to exceed the average turnover rates in the markets where transactions take place.

In sections 4.6 and 4.7 we combine our data on net purchases with excess returns to test some simple models of portfolio choice. We find that U.S. net purchases show very little significant comovement with equity returns, interest rates, dividend yields, exchange rates, and measures of investor wealth. We then use our estimates of international investment positions to test whether U.S. investors allocate portfolios according to the capital asset pricing model (CAPM). Our data strongly reject this hypothesis.

4.2 Reporting of International Securities Transactions

Our data on equity flows are collected from Statistics Canada and the U.S. Department of the Treasury.[1] Foreign direct investment activity is excluded from this data. Statistics Canada reports quarterly net transactions in foreign and domestic bonds and equities between Canadian residents and residents of the United States, the United Kingdom, Japan, and the European Community (EC) excluding the United Kingdom. The U.S. Treasury Bulletin reports quarterly data on purchases and sales of equities and bonds between U.S. residents and foreign residents from Canada, Germany, Japan, and the United Kingdom, and from a large number of other countries. The sample period is 1978:01–1991:03.[2] Data from the U.S. Treasury appear to be the most comprehensive of the data sets (see Tesar and Werner 1992). Appendix A briefly summarizes the reporting requirements specified by the U.S. government.[3] Reports are filed monthly with the Treasury Department covering transactions with foreigners in long-term marketable securities. A foreigner is any individual, partnership, association, corporation, or other organization located outside the United States.[4]

1. Data on corporate and government bonds are available from the same source.

2. The Deutsche Bundesbank reports quarterly purchases and sales of equities and bonds between German residents and residents of Canada, Japan, the United Kingdom, the United States, and a broad set of other countries. We excluded the German data from our analysis to conserve space. We have not been able to find similar bilateral data on international portfolio transactions for the United Kingdom and Japan.

3. This is extracted from *Instructions for preparation of monthly form S, international capital form S.* OMB no. 1505-0001, Treasury Department, Office of the Assistant Secretary for Economic Policy, 1991. We do not have access to the corresponding documentation for Canada. Discussions with representatives from the Bank of Canada lead us to believe that the reporting requirements in Canada are similar.

4. Note that the data reflect the residency of the party involved in the transaction and not the country of origin of the security itself.

Before going on to the analysis, we should mention some of the shortcomings of the data. First, there is no explicit penalty for failing to report securities transactions to the regulatory agencies. However, the securities brokers we have spoken with indicate that they are unlikely to "overlook" reporting requirements, as they wish to stay on friendly terms with reporting agencies. In fact, they are more likely to bend over backwards to remain in compliance. Second, the rapid expansion of markets and the development of new types of financial instruments make it difficult for the reporting agencies to keep pace with the volume of flows.[5] Third, the data may not reflect the transactions of foreign-based firms which are transacting on behalf of domestic residents. An important example are U.S. mutual funds domiciled offshore.[6] Finally, the initial deposit of American Depository Receipts (ADRs) and global Depository Receipts (GDRs) on domestic markets is reflected in the data; however, the subsequent reissue and ultimate trading of these essentially foreign securities by domestic residents is not picked up by our data sources.

Despite these problems, the data provide a wealth of information about international portfolio investment. It is unlikely that the data reflect *all* cross-border securities transactions. However, as long as there is no systematic bias between the reporting of purchases and sales, and there is little reason to suspect such bias during the time period we study, our data can be interpreted as reflecting the investment choices of those investors who report their transactions to official agencies. As will be seen below, to the extent that gross cross-border transactions are underreported, some of the evidence on the magnitude of transactions in foreign equity and turnover becomes even more puzzling.

We will apply two basic concepts to the data on equity transactions. The first, *net equity flows*, is the change in a country's net holdings of foreign equity. We define U.S. residents' net purchases of Canadian securities as gross purchases of foreign securities from Canadian residents *minus* gross sales of foreign securities to Canadian residents. Similarly, Canadian residents' net purchases of U.S. securities are defined as the gross sales of domestic (U.S.) securities by Canadians *minus* the gross purchases by U.S. residents of domestic (U.S.) securities from Canadians. The second concept, *gross equity flows* or *transactions*, is the volume of cross-border equity trading. We define transactions in foreign equity by U.S. residents to be the sum of U.S. residents' purchases of foreign equity from and U.S. residents' sales of foreign equity to foreign residents. Transactions in U.S. equity by foreign residents are similarly defined.

We did some basic cross-checking of the correspondence between comparable series reported by Statistics Canada and the U.S. Treasury. The reported

5. See Stekler and Truman (1992) for a complete description of the problems involved in collecting data on portfolio flows.

6. It is our understanding that in 1992 the United States began collecting data on offshore U.S. brokerages.

net equity flows are significantly positively correlated.[7] It does, however, appear that the average quarterly net purchases of U.S. shares reported by Statistics Canada are less than half of those reported by the U.S. Treasury. No discrepancy of similar magnitude is present for the reported U.S. net purchases of Canadian equity.[8] This may reflect a tendency for Canadian investors to misreport their purchases of U.S. equity. One might suspect that the reason is to avoid taxation or circumvent quantitative capital controls. It is of course also possible that the reporting requirements differ in the two countries. The asymmetric evidence of underreporting, however, is difficult to reconcile with such an explanation.

To facilitate comparisons between equity flows reported by the two official sources, we report all flows in millions of U.S. dollars. The Canadian data are translated into U.S. dollars using the average quarterly exchange rate drawn from the International Financial Statistics (IFS) data base. We produce descriptive statistics for real flows expressed in December 1977 prices. These are computed by deflating nominal flows using the average monthly seasonally adjusted consumer price index for each quarter from Citibase.

4.3 Net Equity Flows

4.3.1 Net Equity Flows Crossing the U.S. Border

Figures 4.1A and 4.1B show net equity flows crossing U.S. borders. These flows became more volatile after the mid-1980s, primarily due to fluctuations in U.S. purchases of Japanese and British equity. Figure 4.1B shows that the same two countries also exhibit the most volatile net purchases of U.S. equity. Note the large sale of U.S. equity by British residents during the fourth quarter of 1987—the quarter including the stock market crash. It is interesting that investors from the other countries did not simultaneously dump U.S. stocks. We will document that such heterogeneity in investor responses across countries appears to be a characteristic of international investment behavior.

Table 4.1A shows that the United Kingdom is the most important counterpart in cross-border equity transactions with the United States. U.S. investors bought on average 169 million constant dollars worth of equity from the United Kingdom per quarter during the 1978:01–1991:03 period. Quarterly net purchases from Canada were less than half that at $74 million, and U.S. investors bought $27 million of equity per quarter from Germany. While average quarterly net flows from the United States to Japan have been modest at $49 mil-

7. The correlation between U.S. net purchases of Canadian equity reported by the two data sources is 0.853. The correlation between reports of Canadian net purchases of U.S. equity is somewhat smaller at 0.518.

8. Tesar and Werner (1992) show that the Canadian investment position in the United States reported by Statistics Canada is considerably smaller than the Canadian investment position reported by the U.S. Treasury.

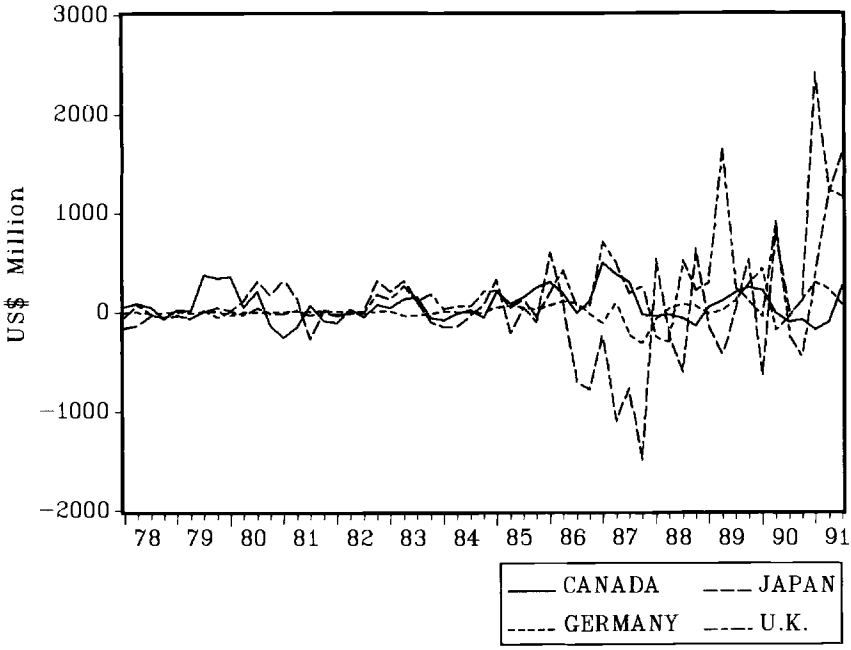

Fig. 4.1A Net U.S. purchases of foreign equity
Source: U.S. Treasury Bulletin (1977 = 100).

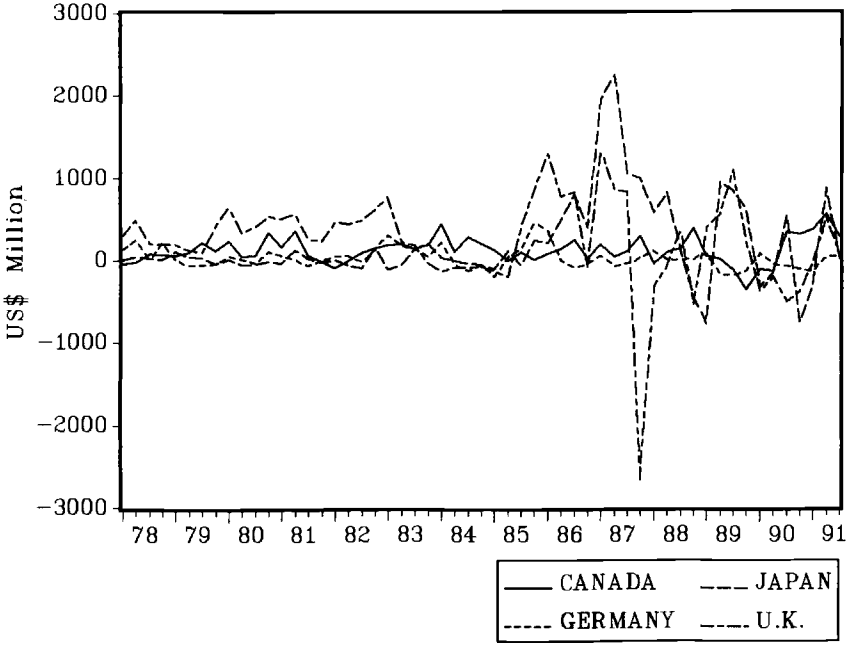

Fig. 4.1B Net foreign purchases of U.S. equity
Source: U.S. Treasury Bulletin (1977 = 100).

Table 4.1A **Net Equity Flows Crossing the U.S. Border 1978:01–1991:03**

Variable[b]	Mean	Standard Deviation	Maximum	Minimum	AR(1)[a]	AR(2)[a]	AR(3)[a]	AR(4)[a]	Ljung-Box(4) *p*-value
U.S. purchases of foreign equity									
Canada	74.0	163.8	503.3	−254.4	0.54*	0.20	−0.06	−0.15	0.000
Germany	26.8	113.0	439.2	−311.4	0.39*	−0.04	−0.05	0.14	0.038
Japan	48.6	592.3	2415.3	−1486.9	0.32*	0.32*	0.25	0.04	0.004
United Kingdom	169.4	370.8	1678.6	−461.3	0.27	−0.09	−0.00	0.13	0.238
Foreign purchases of U.S. equity									
Canada	120.3	161.9	553.1	−364.1	0.43*	0.28*	−0.05	−0.29	0.000
Germany	25.0	131.9	450.4	−208.7	0.45*	0.10	−0.12	−0.13	0.007
Japan	200.1	540.5	2256.0	−796.5	0.54*	0.28*	0.28*	0.20	0.000
United Kingdom	234.8	585.4	1347.3	−2692.1	0.25	0.10	−0.21	0.17	0.072

Source: U.S. Treasury Bulletin.

Note: Units are million U.S. dollars (1977 = 100). AR(1) = autoregression coefficient at lag 1 (lag 2, lag 3, lag 4).

[a]An asterisk indicates significance at the 5 percent level.

[b]Nominal purchases are deflated using the average quarterly consumer price index from Citibase (1977 = 100).

lion, their volatility has been exceptionally high. The table also reports statistics on net purchases of U.S. equity by Canadian, German, Japanese, and British investors. British and Japanese investors have been the dominant foreign investors in U.S. equity, acquiring on average $235 million (41 percent of total inflow) and $200 million (34 percent of total inflow), respectively, per quarter. Canadian investors bought on average 120 million constant U.S. dollars of equity per quarter while German investors spent $25 million per quarter. Note that the combined average quarterly net investment in U.S. equity by foreign investors of $580 million is almost twice as large as the combined average net investment in foreign equity by U.S. investors of $319 million. Thus, net purchases of U.S. equity by foreign residents contributed to financing the U.S. current account deficits of the 1980s and early 1990s.

4.3.2 Net Equity Flows Crossing the Canadian Border

Net equity flows crossing the Canadian border are illustrated in figures 4.1C and 4.1D. Related descriptive statistics are presented in table 4.1B. From Canada's perspective, the United States is its largest trading partner in terms of equity transactions. Canadian average net purchases of U.S. equity of $55 million are more than twice as large as net purchases of British equity at $21 million. U.S. investors provide 85 percent of the average equity flows to Canada. Net purchases by EC residents account for roughly 20 percent of U.S. net purchases. Note that bilateral equity flows between the United States and Canada are not only the largest in magnitude (relative to the other countries) but also exhibit the most volatility. Japanese net equity investment was modest while British investors on average withdrew funds from the Canadian equity market. Net average quarterly equity flows crossing the Canadian border were virtually balanced during this period.

4.3.3 Autocorrelation of Net Equity Flows

The data on U.S. and Canadian net purchases exhibit substantial positive autocorrelation. In only one case, Canadian net purchases of EC equity, do we observe a significantly negative autocorrelation coefficient. This persistence in net purchases may be evidence that investors adjust their portfolios gradually over time. If this is indeed the case, such dynamic adjustments should be incorporated into the development and testing of models of portfolio choice.

The serial correlation of net acquisitions of equity also affects our inference based on simple correlations of net equity flows across markets. We report correlation coefficients since they have the advantage of being unit-free. However, the calculation of appropriate standard errors of the estimated correlation coefficients between time series with serial correlation is not straightforward. Instead we base our inference on the covariance between the time series, and correct the corresponding standard errors for autocorrelation using a method proposed by Newey and West (1987). The method is outlined in appendix B.

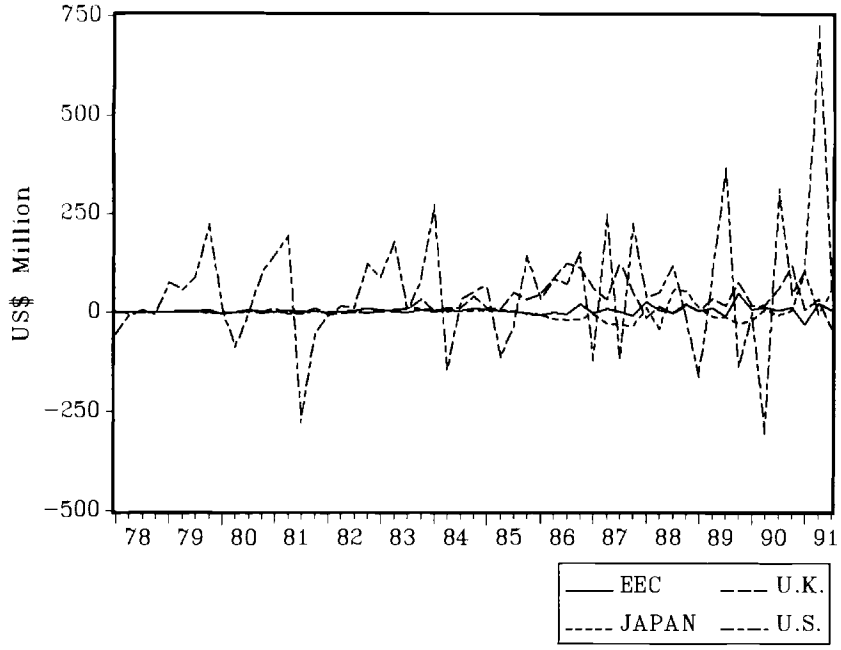

Fig. 4.1C Net Canadian purchases of foreign equity
Source: Statistics Canada (1977 = 100).

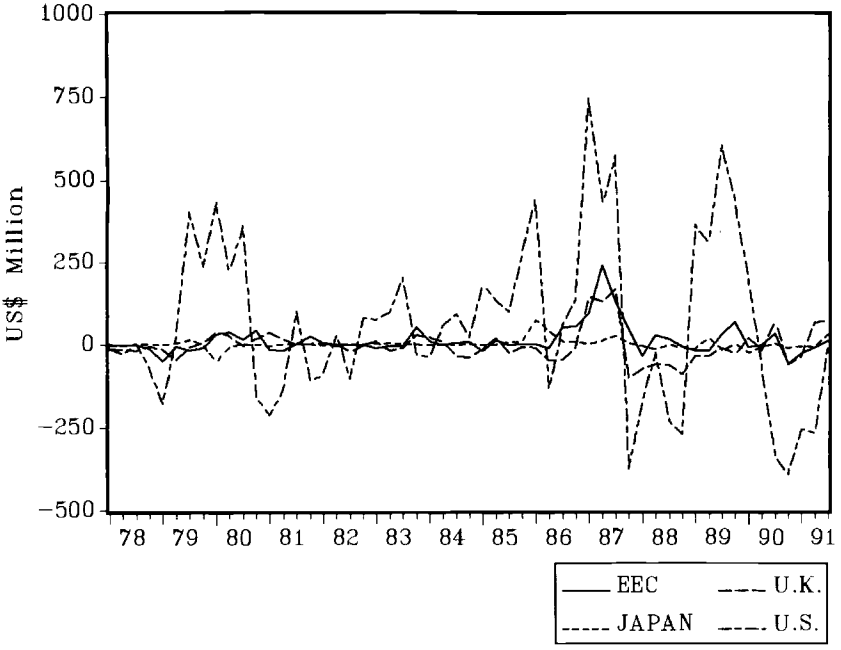

Fig. 4.1D Net foreign purchases of Canadian equity
Source: Statistics Canada (1977 = 100).

Table 4.1B **Net Equity Flows Crossing the Canadian Border 1978:01–1991:03**

Variable[a]	Mean	Standard Deviation	Maximum	Minimum	AR(1)[b]	AR(2)[b]	AR(3)[b]	AR(4)[b]	Ljung-Box(4) *p*-value
Canadian purchases of foreign equity									
European Community									
excluding United Kingdom	3.5	10.3	46.6	−30.0	−0.30*	0.16	−0.02	0.13	0.098
Japan	0.9	23.2	105.1	−43.5	0.14	0.26	0.02	−0.18	0.128
United Kingdom	21.3	36.2	127.3	−40.3	0.49*	0.39*	0.32	0.38*	0.004
United States	54.5	160.9	726.7	−307.7	−0.14	−0.02	−0.03	−0.09	0.238
Foreign purchases of Canadian equity									
European Community									
excluding United Kingdom	12.3	45.3	240.8	−58.1	0.56*	0.23	0.09	−0.02	0.789
Japan	1.6	16.5	74.9	−52.8	0.30*	0.10	0.02	0.05	0.190
United Kingdom	−2.1	51.0	169.7	−100.0	0.39*	0.06	−0.22	−0.15	0.010
United States	67.6	257.2	752.8	−394.5	0.48*	0.22	−0.15	−0.24	0.000

Source: Statistics Canada.

Note: Units are million U.S. dollars (1977 = 100). AR(1) = autoregression coefficient at lag 1 (lag 2, lag 3, lag 4).

[a]Nominal purchases are translated into U.S. dollars using the average quarterly exchange rate from Citibase. Dollar purchases are deflated using the average quarterly consumer price index from Citibase (1977 = 100).

[b]An asterisk indicates significance at the 5 percent level.

Our null hypothesis is that the estimated covariances are zero, or that net equity flows are uncorrelated.

4.3.4 Correlations of Net Equity Flows across Markets

In tables 4.2A and 4.2B, we report the correlations among real net equity flows to investigate the extent to which net acquisitions of equity are synchronized across investors from different countries. Suppose that investors follow a simple mean-variance model for asset allocation, and that for exogenous reasons they start with a portfolio of primarily domestic securities. In such a world, the decision to invest in foreign equity can be prompted by an expectation that the return to foreign equity will exceed the return on domestic equity or that the inclusion of foreign equity in the portfolio will reduce risk.

To the extent that cross-border investment is driven solely by differences in expected returns, we expect to see a negative contemporaneous correlation between domestic investors' net purchases of foreign equity and foreign investors' net purchases of domestic equity. Moreover, investors would channel funds into the same "foreign" market simultaneously. If, on the other hand, cross-border investment is driven primarily by the desire to diversify across markets, the correlation between net equity purchases crossing a border from different directions might very well be positive. The diversification motive might, alternatively, make different investors target different foreign markets for their investment, which means that the cross-sectional correlations could be positive or negative.

Of course, portfolio flows between countries are part of the larger picture of trade and financial linkages that connect open economies. If equity flows are in some sense the "residual" component of the capital account, net equity flows may be determined by factors quite separate from the simple mean-variance trade-offs discussed above.

The first panel of table 4.2A shows the correlation between quarterly net purchases of foreign equity by U.S. residents. The marginal significance levels give the probability that the estimated covariance is zero. U.S. net purchases of equity from Canadian and Japanese residents are negatively correlated, while the rest of the pair-wise correlations of net purchases are positive. In no case are the covariances significantly different from zero. Correlation of foreign investors' net purchases of U.S. equity, reported in the second panel of the table, have mixed signs, but again none of the covariances are significant. Thus, there appears to be little synchronization in foreign investment in U.S. equity. The bottom panel reports the correlations between U.S. net acquisitions of foreign equity and foreign acquisitions of U.S. equity. If U.S. and Canadian investors concur, for example, that it is appropriate to reallocate the portfolio between U.S. and Canadian equity, we anticipate that the correlations will be negative. While the majority of correlations are in fact negative, none of the covariances are significantly different from zero.

A somewhat different picture emerges from the correlation between cross-

Table 4.2A **Correlations: Net Equity Flows Crossing the U.S. Border 1978:01–1991:03**

	Correlation	Marginal Significance Level[a]	Correlation	Marginal Significance Level[a]	Correlation	Marginal Significance Level[a]
U.S. purchases of equity from:	Germany		Japan		United Kingdom	
Canada	0.00	1.00	−0.19	0.16	0.19	0.16
Germany			0.35	0.15	0.04	0.39
Japan					0.23	0.49
Purchases of U.S. equity by:	Germany		Japan		United Kingdom	
Canada	0.02	0.87	−0.05	0.64	−0.18	0.15
Germany			−0.14	0.20	0.20	0.27
Japan					0.20	0.15
Investor Agreement between the United States and:						
Canada		Germany		Japan		United Kingdom
Correlation	MSL[a]	Correlation	MSL[a]	Correlation	MSL[a]	Correlation	MSL[a]
−0.32	0.19	−0.13	0.23	−0.37	0.25	0.15	0.23

Source: U.S. Treasury bulletin.

Note: Units: Million U.S. dollars (1977 = 100).

[a]The marginal significance level (MSL) gives the probability under the null that the covariance is zero.

border flows for Canada in table 4.2B. The correlation between Canadian net purchases of foreign equity in the first panel are of mixed signs, suggesting more of a reallocation across markets rather than a general increase in Canadian holdings of all foreign equity. None of the covariances are, however, significantly different from zero. The consistently positive correlations in the second panel indicate that there appears to be a consensus among British, EC, and U.S. investors about the appropriate timing of investment in Canadian equities. However, the mixed signs and the high marginal significance levels in the bottom panel suggest that Canadian investors do not agree with the investors in the other countries.

The overwhelming impression from tables 4.2A and 4.2B is the lack of significant correlation among net equity flows.[9] Given the general nature of the alternative hypothesis and that the sample is rather limited, we do not expect to have much power against the null. The absence of comovement in net equity flows may indicate that the decisions about international portfolio choice are guided primarily by the diversification motive. This conclusion is somewhat contradicted by the high volume of cross-border investment between countries

9. In examining the correlations between U.S. net purchases of equity from nineteen countries, including fifteen emerging stock markets, Tesar and Werner (1994b) also find little or no correlation between net purchases from different markets.

Table 4.2B **Correlations: Net Equity Flows Crossing the Canadian Border 1978:01–1991:03**

	Correlation	Marginal Significance Level[a]	Correlation	Marginal Significance Level[a]	Correlation	Marginal Significance Level[a]
Canadian purchases of equity from:	Japan		United Kingdom		United States	
EC excluding United Kingdom	−0.26	0.46	0.16	0.44	−0.02	0.93
Japan			−0.41	0.14	−0.06	0.27
United Kingdom					0.04	0.48
Purchases of Canadian equity by:	Japan		United Kingdom		United States	
EC excluding United Kingdom	0.11	0.40	0.59	0.24	0.44	0.18
Japan			0.09	0.57	0.12	0.51
United Kingdom					0.44	0.35

Investor Agreement between Canada and:								
EC excluding United Kingdom		Japan		United Kingdom		United States		
Correlation	MSL[a]	Correlation	MSL[a]	Correlation	MSL[a]	Correlation	MSL[a]
0.06	0.54	−0.06	0.67	0.09	0.67	−0.24	0.23

Source: Statistics Canada.

Note: Units are million U.S. dollars (1977 = 100).

[a]The marginal significance level (MSL) gives the probability under the null that the covariance is zero.

whose stock markets are highly positively correlated, that is, Canada and the United States. Another potential explanation is that investors' strategies for portfolio allocation differ substantially across countries. Alternatively, net equity purchases may be mainly affected by more general macroeconomic conditions such as business cycle fluctuations, the differential between output growth at home and abroad, or fiscal policies.

4.4 Cumulated Foreign Investment Positions

In the remainder of this paper we concentrate on equity flows to and from the United States as reported by the U.S. Treasury. Using our bilateral data on net purchases of equity, we construct a quarterly time series of U.S. foreign investment positions. Such data are not available from published sources.[10] The

10. The Department of Commerce reports only the investment position on an annual basis for a limited number of countries. Their reported series are constructed in a way similar to the method we propose below.

time series are interesting for two reasons. First, they provide information about the allocation of the U.S. investment portfolio across global markets. Second, the investment positions are the relevant base for thinking about turnover rates on foreign equity investments.

To create an investment position series from U.S. net purchases of equity, we cumulate net purchases starting from an initial investment position, which we take as the investment position at the end of 1977 as estimated by the Department of Commerce. At the end of 1977, the reported U.S. investment position was $4,971 million in Canada, $350 million in Japan, and $4,485 million in Western Europe. We allocate the Western Europe position over Germany and the United Kingdom according to their relative market sizes at the end of 1977.[11] The resulting position is $1,794 million in Germany and $2,691 million in the United Kingdom. Starting from these initial values, denoted X_0^i, the quarterly investment position is created using the following algorithm:

$$X_{t+1}^i = X_t^i(1+R_{t+1}^i) + NP_{t,\,t+1}^i, \tag{1}$$

where X_t^i is the U.S. investment position in market i at t, R_{t+1}^i is the gross return (including dividends) on equity in market i over the quarter, and $NP_{t,\,t+1}^i$ represents quarterly net purchases of U.S. investors from market i.[12] Using the data on net foreign purchases of U.S. equity, the same algorithm can be used to generate the investment position of foreign investors in the United States.[13]

The resulting series for U.S. investment positions across foreign markets as a fraction of the U.S. market capitalization are plotted in figure 4.2A.[14] According to our estimates, the U.S. international investment position increased from 1.3 percent of U.S. equity market capitalization in the first quarter of 1978 to 3.9 percent by the third quarter of 1991. This increase can largely be accounted for by the growing U.S. investment position in the United Kingdom, which went from 0.3 percent in 1978:01 to 1.7 percent at the end of the sample. U.S. holdings of Canadian equity increased sharply from 0.7 in 1978:01 to 1.6 percent in the first quarter of 1980, but have since fallen to a level of 1.2 percent. The U.S. investment positions in Germany and Japan remained stable and low at around 0.5 percent throughout the sample period.

11. According to Morgan Stanley Capital International, the market capitalization of Germany was $65.1 billion, and that of the United Kingdom was $96.4 billion in the fourth quarter of 1977. We apply the weights of 40 percent and 60 percent to Germany and the United Kingdom, respectively, for the initial values of our Western Europe aggregate.

12. Gross returns are calculated using stock market indices from Morgan Stanley Capital International.

13. As initial values, we use the reported foreign investment positions (assuming a 60-40 split between the United Kingdom and Germany): Canada, $5,671 million; Japan, $594 million; Germany, $17,083 million; and the United Kingdom, $11,389 million.

14. Our estimates of the U.S. investment position are slightly lower than those reported by the Department of Commerce. At the end of 1990, they estimate the foreign investment position in Canada and Western Europe combined to be $86,510 million. Our estimate is $85,907 million. The Department of Commerce stopped reporting the U.S. investment position in Japan in 1987 since they perceived the position to be grossly underestimated.

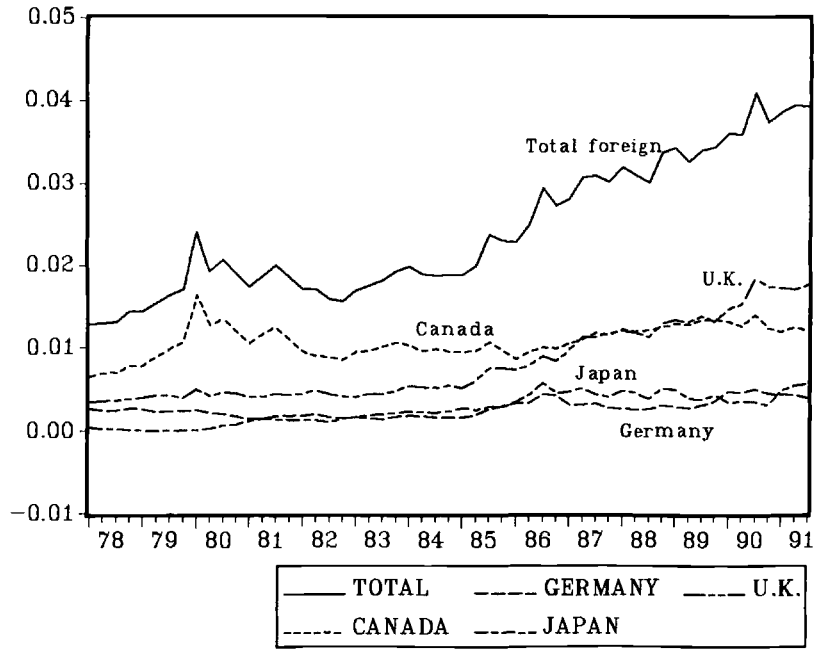

Fig. 4.2A U.S. equity investment position in foreign equity
Note: U.S. equity investment position as a fraction of U.S. market capitalization.

The investment positions of foreign investors in the United States as fractions of U.S. market capitalization are reported in figure 4.2B.[15] Total foreign holdings of U.S. equity increased steadily over the sample from a level of 4.3 percent at the outset to a level of 11.5 percent by the end of the sample. All countries increased their investment positions in the United States, but the most dominant contributors to U.S. risk capital were British investors whose equity holdings went from 2.1 to 5.6 percent of U.S. market capitalization over the 1978–91 period. The Japanese investment position began to rise in the mid-1980s and reached a level of 1.1 percent of U.S. market capitalization by the third quarter of 1991. This late start can in part be explained by the relaxation of capital controls which took place in Japan in the mid-1980s.[16] Canadians

15. Our estimated investment positions of foreign investors in the United States are larger than those reported by the Department of Commerce. They estimate the total foreign investment position by these countries at the end of 1990 to be $188,967 million. Our estimate is substantially larger at $256,004 million. This is a bit surprising since our algorithm tends to bias the estimated position downwards by not crediting capital gains to equity acquired during the quarter of purchase. On the other hand, we assume that all dividends from foreign equity investment are reinvested, which may make the investment position too large.

16. See Riddle (1992) for a discussion of capital controls in the five countries in our sample.

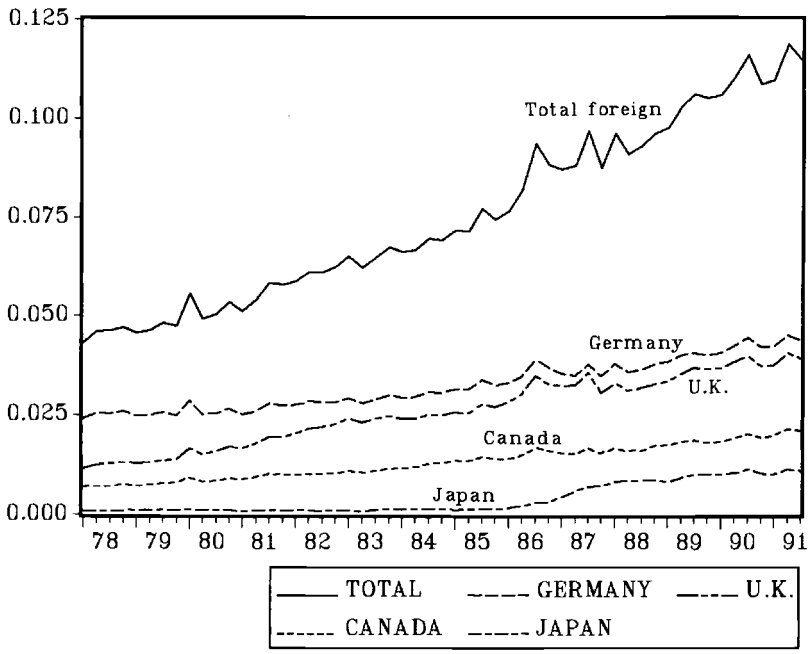

Fig. 4.2B Foreign equity investment position in U.S. equity
Note: Foreign equity investment position as a fraction of U.S. market capitalization.

and Germans held 2.1 and 2.7 percent, respectively, of the U.S. equity market by the end of the sample.

Although the data display a steadily increasing level of investment in foreign equity markets by U.S. investors, the fraction of U.S. wealth allocated to foreign markets by U.S. investors is still very limited. According to our estimates, over 96 percent of U.S. wealth was invested in U.S. equity in 1991. Home bias is still very much a feature of international equity markets.

4.5 Gross Equity Flows and Turnover

Table 4.3 provides descriptive statistics on gross cross-border equity trading. We report the real value of transactions by U.S. residents in Canadian, German, Japanese, and British equity as well as the value of transactions in U.S. equity by residents from Canada, Germany, Japan, and the United Kingdom. As a benchmark, we also report the combined quarterly real trading volume in the United States, defined as the trading volume on the American Stock Exchange, NASDAQ (National Association of Securities Dealers Automated Quotations), and the New York Stock Exchange. The first three columns report the means, standard deviations, and coefficients of variation, respectively, for the

Table 4.3 **Gross Cross-Border Equity Trading 1978:01–1991:03**

	1978:01–1991:03 (55 observations)			1978:01–1984:04 (28 observations)			1985:01–1991:03 (27 observations)		
Variable	Mean	Standard Deviation	Standard Deviation/ Mean	Mean	Standard Deviation	Standard Deviation/ Mean	Mean	Standard Deviation	Standard Deviation/ Mean
Real transactions by U.S. residents in equity from[a]									
Canada	1097	528	0.48	774	314	0.40	1432	498	0.35
Germany	495	536	1.08	90	58	0.65	916	483	0.53
Japan	3239	3009	0.93	790	421	0.53	5778	2338	0.40
United Kingdom	4067	4251	1.05	633	335	0.53	7628	3398	0.45
Real transactions in U.S. equity by residents from[a]									
Canada	3399	1810	0.53	1895	651	0.34	4960	1183	0.24
Germany	1187	529	0.45	834	300	0.36	1553	463	0.30
Japan	3918	5227	1.33	325	152	0.47	7645	5328	0.70
United Kingdom	6555	4457	0.68	2740	1257	0.46	10512	2771	0.26
Total real transactions in U.S. equity[a]	170311	85071	0.50	98480	37123	0.38	244801	47757	0.20

Source: U.S. Treasury Bulletin.

Note: Units are million U.S. dollars (1977 = 100).

[a]Nominal gross flows are deflated using the average quarterly consumer price index from Citibase.

entire period, 1978:01–1991:03. Results for subsamples are reported in columns four through nine.

The numbers in the first column indicate that the largest average volume of transactions is between U.S. and British citizens. The second largest volume is transactions between U.S. and Japanese citizens, followed by U.S. transactions in equity with Canadians and Germans. This ranking holds regardless of whether transactions involve U.S. or foreign equity. By comparing the results in table 4.3 with our figures on net equity flows in table 4.1A, it is clear that the gross transactions volume vastly exceeds the corresponding net transactions volume. Gross quarterly transactions range from eighteen (U.S. transactions with German citizens) to sixty-seven (U.S. transactions with Japanese citizens) times the average quarterly net bilateral equity flows. Comparing the two subperiods, we also find a large increase in average quarterly transactions over time. Looking across U.S. residents' transactions in foreign equity, the increase is 1105 percent in British equity, 919 percent in German, 631 percent in Japanese, and 85 percent in Canadian. Correspondingly, the quarterly level of transactions in U.S. equity went up by 2253 percent for Japanese residents, 284 percent for British, 162 percent for Canadian, and 86 percent for German.

The volume of gross cross-border equity trading displays considerable variation over time. In terms of volatility relative to the mean, U.S. residents' transactions in foreign equity from Germany, Japan, and the United Kingdom are each about twice as high as the volatility (compared to the mean) of their transactions in Canadian equity. An even higher volatility compared with the mean is evident in Japanese transactions in U.S. equity. Although the volatility of transactions went up dramatically from the earlier to the later part of the sample, the coefficients of variation for the two subsamples fell in all cases except Japanese transactions in U.S. equity, where the volatility almost doubled. Interestingly, the same pattern of declining coefficients of variation appears in U.S. transactions in emerging stock markets (Tesar and Werner 1993b). The data seem to indicate that as U.S. investors increase their investment position in a particular market, their transactions volume (relative to the mean level of transactions) declines.

By cumulating the (nominal) quarterly gross cross-border transactions over each year and dividing by the estimated dollar investment position we obtain the turnover rates for cross-border equity trading. Table 4.4 reports the annual turnover rates (in percent) for each year from 1982 to 1990. The first striking observation is that turnover rates for foreign investments are higher than the turnover rate in the investor's home market and in the market where trading takes place. Interestingly, the most extreme cases are Japanese investors' turnover rates in the U.S. equity market, with an average of 334 percent, and U.S. investors' turnover in Japanese equities of 377 percent. One possible explanation for these extraordinarily high numbers is that the base, or the investment position, is underestimated. However, one would have to increase sixfold the estimated positions of U.S. investors in Japan and Japanese investors in the United States to get turnover rates at par with the benchmarks. Also, U.S. in-

Table 4.4 **Turnover in Cross-Border Equity Trading (percent)**

Turnover	1982	1983	1984	1985	1986	1987	1988	1989	1990	Mean
U.S. market[a]	44	48	48	55	65	93	56	53	49	57
Canadians in U.S.[b]	86	98	89	89	103	122	85	88	69	92
Germans in U.S.[b]	17	28	22	17	21	29	20	23	17	21
Japanese in U.S.[b]	181	229	151	348	502	658	513	228	198	334
British in U.S.[b]	49	54	49	53	65	87	65	67	60	61
Foreigners in U.S.[b]	49	57	51	55	73	117	98	75	65	71
Canadian market[a]	14	17	15	20	11	35	24	25	23	20
Americans in Canada[b]	29	33	29	38	47	60	33	29	26	36
German market[a]	24	44	42	54	72	279	151	106	97	97
Americans in Germany[b]	27	51	33	47	74	105	69	72	105	65
Japanese market[a]	35	127	35	36	28	75	60	63	49	56
Americans in Japan[b]	298	272	257	244	254	405	450	556	654	377
U.K. market[a]	31	36	37	38	57	107	66	44	42	51
Americans in U.K.[b]	72	96	97	109	182	235	174	209	193	152
Americans abroad[b]	61	75	76	87	129	181	150	170	165	122

[a]From "Anatomy of World Markets," 1991, Goldman Sachs Investment Research, table 1.18, p. 17.

[b]Authors' estimates based on gross transactions as reported by the U.S. Treasury and authors' own estimates of investment positions based on cumulated net purchases of equity. We take the annual averages of our estimated investment positions as the base and the annual transactions volume to be the quarterly transactions cumulated over the year.

vestors trading in British equity and Canadian investors trading in U.S. equity turn over their positions at a substantially higher rate than they do in their home markets. These turnover rates are also higher than the average turnover rates in the United Kingdom and the United States, respectively. The only exception is German investors, who transact at a very modest average rate of 21 percent in the United States. Based on the last column, which gives the mean turnover rate over the entire period, it appears that U.S. investors have a larger tendency to "churn" their portfolios of foreign securities than foreign investors trading in U.S. equity.[17]

Another message from the table is that turnover rates vary, both across different markets and across time. For instance, the average turnover rate for Germany at 97 percent is substantially higher than that of the other countries. The Canadian market is at the other extreme, with an average turnover rate of 20 percent. Turnover also varies over time for most markets. All markets experienced a temporary increase in turnover after the stock market crash in 1987.

The heterogeneity in turnover rates for foreign investments is seen most easily in figures 4.3A and 4.3B, which illustrate U.S. investors' turnover rates

17. Tesar and Werner (1994a) discuss the high turnover rate on foreign equity holdings in more detail.

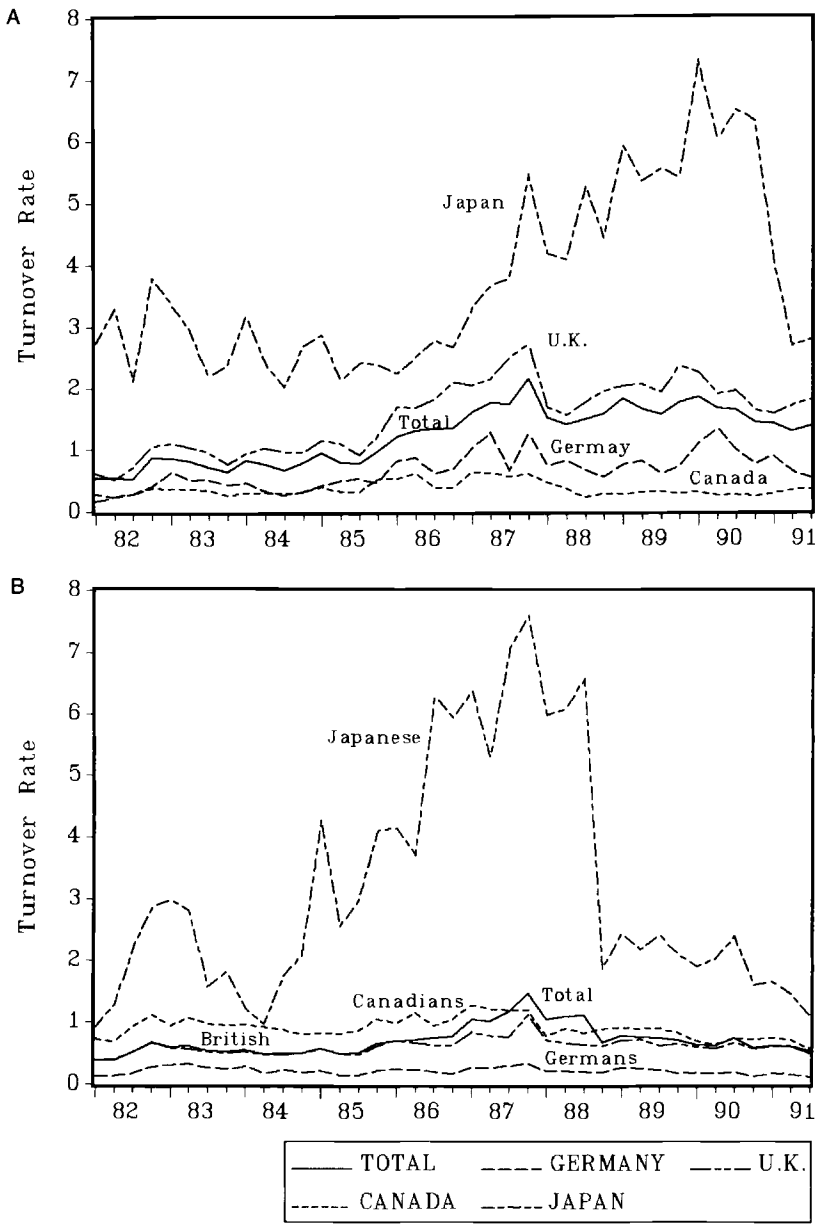

Fig. 4.3 (A) U.S. investors' turnover rates in foreign equity; (B) Foreign investors' turnover rates in U.S. equity
Note: Transactions divided by the investment position.

in foreign equity and foreign investors' turnover rates in U.S. equity in the 1982:01–1991:03 period. Turning first to figure 4.3A, we see that U.S. investors' turnover rate on the Japanese market is substantially larger than in other markets, and that there is a large increase in the turnover rate in the 1987–90 period, followed by a sudden drop in the second quarter of 1991. The time variation in turnover rates is even more dramatic in figure 4.3B. The turnover rate on U.S. equity holdings by Japanese investors increased roughly 800 percent between 1984 and 1987, falling off suddenly in the fourth quarter of 1988.

Several things should be kept in mind in comparing turnover rates across markets and over time. First, the numbers used in creating our measures of turnover rates may contain substantial measurement errors. Second, differences in regulations across countries and changes in regulations over time may affect where an investor chooses to conduct his or her financial transactions. This in turn may affect whether the transaction is considered a transaction with a domestic resident (in which case it will not be reported) or with a foreign resident. Finally, the transactions data include derivative securities. In periods of volatile returns in equity markets, investors may hedge their portfolios, effectively transacting several times on the same underlying investment position.

Whatever the source of the variation in turnover rates, the high volume of transactions and the high turnover rates in cross-border equity trading make it difficult to ascribe the home-bias puzzle to high variable transactions costs. The high turnover rates also give some indication that foreign equity investment may be dominated by institutional investors who face lower transactions costs than the average investor.

4.6 What Drives U.S. Net Equity Flows?

Even though we have seen no strong patterns of comovement between net equity flows, it is still possible that international equity purchases are sensitive to variables such as returns and risk. Table 4.5 reports the correlations of U.S. net purchases of equity from Canada, Germany, Japan, and the United Kingdom with four sets of financial variables.[18] The marginal significance levels refer to the probability that the estimated covariances are zero.

The first set of variables are contemporaneous changes (in absolute terms) in the market capitalization of the United States and each of the foreign markets. Changes in U.S. market capitalization proxy for changes in the wealth of U.S. investors. If U.S. investors follow a strategy of holding a constant fraction of their wealth in foreign equity, an increase in wealth would be associated with increased purchases of foreign equity. Judging from the consistently positive correlations in the first row of the table, this hypothesis has some support in

18. We use the following data sources. Data on market capitalization, equity returns, and dividend yields are calculated from the stock market indices published by Morgan Stanley Capital International. Treasury bill returns are from the Center for Research in Security Prices (CRSP) and exchange rates are from Citibase.

Table 4.5 **Correlations of Net U.S. Equity Flows and Financial Variables 1978:01–1991:03**

	Net U.S. Purchases of Equity from:							
	Canada		Germany		Japan		United Kingdom	
Financial Variable	Correlation[b]	Marginal Significance Level[a]	Correlation[b]	Marginal Significance Level[a]	Correlation[b]	Marginal Significance Level[a]	Correlation[b]	Marginal Significance Level[a]
Changes in market capitalization:								
United States	0.30	0.21	0.21	0.16	0.46	0.11	0.23	0.10
Foreign	0.32	0.17	0.45	0.15	0.22	0.30	0.17	0.15
Average equity returns and betas with U.S. market:								
U.S. return	0.30	0.19	0.14	0.17	0.33	0.08	0.17	0.06
Foreign return	0.26	0.15	0.37	0.11	0.20	0.16	0.09	0.24
Foreign beta[c]	−0.12	0.17	0.29	0.23	0.12	0.41	0.04	0.89
Average dividend yields and interest rates:								
U.S. yield	−0.27	0.13	−0.20	0.41	−0.06	0.83	−0.45*	0.03
Foreign yield	−0.40	0.09	−0.08	0.33	0.01	0.97	0.10	0.51
30-day U.S. T-bill	−0.27	0.25	−0.10	0.63	−0.04	0.88	−0.26	0.15
90-day U.S. T-bill	−0.31	0.20	−0.11	0.49	−0.04	0.85	−0.24	0.19
Average exchange rate:[d]								
(*i*) Returns								
Trade-weighted	−0.36	0.12	0.09	0.47	0.15	0.26	0.14	0.42
Bilateral	−0.07	0.42	0.06	0.62	0.01	0.87	−0.15	0.41
(*ii*) Levels								
Trade-weighted	0.07*	0.01	−0.06	0.71	−0.11	0.52	−0.04	0.69
Bilateral	0.31	0.23	−0.11	0.61	−0.07	0.79	−0.22	0.17

Sources: Net purchases of equity come from the U.S. Treasury Bulletin. Stock market returns, dividend yields, and market capitalizations come from Morgan Stanley Capital International. T-bill returns are from the Center for Research in Security Prices (CRSP) and exchange rates are from Citibase.

[a]The marginal significance level gives the probability under the null that the covariance is zero.

[b]An asterisk (underlined coefficient) indicates that the covariance is significantly different from zero at 5 (10) percent.

[c]Authors' estimates of beta defined as the covariance of the return on the foreign market with the U.S. market, divided by the variance of the return to the U.S. market. Estimates are made on rolling sixty-month samples of excess returns using data from Morgan Stanley Capital International and CRSP.

[d]Note that the U.S. exchange rate is expressed as U.S. dollars per pound.

the data. For U.S. investment in the United Kingdom, the covariance is significantly different from zero at the 10 percent level. Media tend to follow high growth markets, and to the extent that U.S. investors follow the advice of investing in such markets they would increase their equity purchases as foreign market capitalization increases. The correlation coefficients in the second row of the table are all positive, but the association is not significant.

The second set of variables is related to the returns on equity in the respective markets. Models of portfolio allocation relate investment decisions to expected returns and risk. In this simple illustration, we view the average realized monthly excess return over the quarter as a rough proxy for expected future returns. If the decision to invest in equity hinges on the investor's expectation of returns, one would expect that increases in U.S. returns should tend to decrease foreign equity purchases, while increases in foreign returns should increase net equity purchases from abroad. The results show that net equity flows generally are positively correlated with *both* U.S. and foreign returns. U.S. purchases of equity from Japan and the United Kingdom covary positively with the return on the U.S. market. Part of the explanation for the positive correlation might be that U.S. equity returns are highly correlated with changes in U.S. wealth. Although U.S. net equity purchases are consistently positively correlated with the return on foreign markets, none of the marginal significance levels are lower than 10 percent.

To capture the impact of risk on foreign investment, we measure the correlation between net purchases and the beta of the foreign market. Beta is measured as the covariance between excess returns on the foreign market and the U.S. market divided by the variance of excess return in the U.S. market based on sixty-month (five-year) rolling samples. One would expect that U.S. investors would decrease their purchases of equity from a market when that market covaries more strongly with the U.S. market. There is no evidence for such a pattern in the data.

It is often suggested by policymakers and the financial press that recent increases in capital outflows from the United States can be explained by historically low domestic interest rates. To check whether this is borne out by the data, we correlate net purchases with U.S. and foreign dividend yields and U.S. interest rates. A majority of the estimated correlations are negative, as predicted, but only in the case of U.S. investment in the United Kingdom does the marginal significance level imply that we reject the null hypothesis of no association. The correlations between U.S. net purchases and foreign yields have mixed signs. For U.S. acquisitions of Canadian equity, the association is significantly negative. We finally investigate the correlation between returns to and levels of trade-weighted and bilateral exchange rates and net equity flows. Bilateral exchange rates seem generally to be of limited importance for cross-border investment decisions. The level of the trade-weighted U.S. dollar is significantly positively related to U.S. net purchases of Canadian equity, but the

value of the dollar has no significant impact on purchases of equity from other countries.[19]

Of the financial variables we examine, very few are significantly associated with acquisitions of foreign equity by U.S. investors. Granted, our measures of expected returns and risk are crude and might not adequately capture the importance of such variables in general for international portfolio transactions. In addition, simple correlations do not capture the investor's problem of trading off risk and return across financial assets. It is still puzzling that the data display so little systematic comovement between equity flows and simple measures of return and risk. We turn to a more explicit test of portfolio allocation in the next section.

4.7 Do U.S. Investors Allocate Their Portfolios according to the CAPM?

Recent tests of international asset-pricing models yield mixed results about the extent of global market integration and the validity of the CAPM in an international context (Frankel 1982; Wheatley 1988; Engel and Rodrigues 1989, 1992; Korajczyk and Viallet 1989; Harvey 1991; Cooper and Kaplanis 1994; Ferson and Harvey 1991; Dumas and Solnik 1992; Heston, Rouwenhorst, and Wessels 1992; Harvey 1993). We combine our estimates of the *actual* international investment positions of U.S. investors in foreign equities with data on equity returns to test whether the observed U.S. portfolio allocation satisfies the first-order conditions of maximization in a simple CAPM world. This amounts to testing whether the portfolio chosen by U.S. investors is mean-variance efficient.

Consider the set of first-order conditions dictating the demand for risky assets in a standard capital asset pricing model (Merton 1973):

$$v_{t+1} = \gamma \Omega x_t, \tag{2}$$

where x_t is a vector of portfolio allocations chosen by the investor at t, γ is the risk aversion of the investor, Ω is the covariance matrix of excess returns, and v_{t+1} is a vector of expected excess returns between t and $t + 1$. When preferences are isoelastic, γ is the coefficient of relative risk aversion and x_t corresponds to shares of wealth.

The traditional way of implementing empirical tests of the CAPM involves aggregating similar conditions across all investors, exploiting the fact that the market portfolio equals the market-capitalization weighted average of returns to individual equity markets. We will instead exploit our information on portfolio allocations to directly test the implications of the model on the first-order condition for maximization of one group of investors, namely, U.S. residents. If the model accurately describes investment behavior, the first-order condi-

19. Froot and Stein (1991) find no significant relationship between the value of the dollar and aggregate portfolio *inflows*.

tions in equation (2) should be satisfied for each investor in international equity markets.

Our empirical implementation follows Engel and Rodrigues (1992). We assume that U.S. investors have access to a constant risk-free rate, r. Let $R_{t+1} - r$ denote the realized excess return on equity. If expectations are rational, it follows that

$$R_{t+1} - r = \nu_{t+1} + \varepsilon_{t+1}, \tag{3}$$

where ε_{t+1} is a white noise error term. The first-order conditions can then be restated as

$$R_{t+1} - r = \gamma \Omega x_t + \varepsilon_{t+1}. \tag{4}$$

The corresponding unrestricted model is

$$R_{t+1} - r = Bx_t + \varepsilon_{t+1}, \tag{5}$$

where B is a matrix of regression coefficients of the same dimension as the covariance matrix.

Under the null, the covariance matrix of the residuals, $\varepsilon\varepsilon'$, is equal to the covariance matrix of excess returns, Ω. Thus, the restrictions we test are that the regression coefficients in the matrix B are proportional to the covariance matrix of the residuals. The unidentified constant of proportionality is equal to the coefficient of risk aversion of U.S. investors. Under the assumption that the covariance matrix is constant over time, the test involves first estimating the unrestricted system in equation (5) using full information maximum likelihood (FIML). The system of equations is then reestimated, imposing the constraints implied by the model. We use a likelihood-ratio test to see whether the data reject the null hypothesis that the constraints implied by the model hold. The likelihood-ratio (LR) statistic has an asymptotic $\chi^2(q)$ distribution, where q is the number of restrictions imposed.

The results from the FIML estimation of the five-equation system of excess returns on U.S. portfolio shares are given in table 4.6. The model assumes that investors have preferences with constant relative risk aversion, and that x_t corresponds to shares of wealth invested in Canada, Germany, Japan, the United Kingdom, and the United States, respectively. As a proxy for U.S. wealth, we use the U.S. market capitalization plus the total foreign investment position of U.S. investors *minus* the total investment position by foreign investors in the United States. The top panel of the table reports the estimated regression coefficients and the corresponding standard errors. Few of them are significantly different from zero, which is to be expected given the well-known difficulty of explaining the ex post variation in excess equity returns. The covariance matrix of the residuals is given in the lower panel in table 4.6. Covariances are multiplied by 100. Note that there is considerable variation in the ratios of estimated coefficients, b_{ij}, to the corresponding elements of the covariance matrix, s_{ij}. Under the null hypothesis that the model is correct, all those ratios should be equal.

Table 4.6 **Regressions of Excess Returns on U.S. Portfolio Shares**

Investment Position Equation	Canada (standard error)	Germany (standard error)	Japan (standard error)	United Kingdom (standard error)	United States (standard error)
Estimated coefficients:[a]					
Canada	10.053	15.200	4.343	−8.184	−0.085
	(27.479)	(62.609)	(27.563)	(20.403)	(0.318)
Germany	−0.986	56.412	21.987	−16.519	−0.051
	(53.261)	(67.497)	(27.972)	(28.770)	(0.507)
Japan	−2.947	35.781	59.197 *	−27.294	0.035
	(25.935)	(34.962)	(24.152)	(15.009)	(0.248)
United Kingdom	1.482	23.405	6.471	−5.787	−0.025
	(18.945)	(70.488)	(36.440)	(26.984)	(0.249)
United States	−2.204	−5.556	10.472	−0.955	0.039
	(32.846)	(63.131)	(27.948)	(28.127)	(0.337)
Covariance matrix of residuals (×100):					
Canada	1.039	0.198	0.323	0.590	0.604
Germany		1.104	0.245	0.408	0.306
Japan			0.815	0.423	0.295
United Kingdom				0.893	0.438
United States					0.692
Log-likelihood:	307.67				

Sources: The initial investment position was taken from the Department of Commerce, Survey of Current Business. We used net equity flows reported in the U.S. Treasury Bulletin to create the quarterly investment positions of U.S. investors. The U.S. market capitalization as well as returns on equity indices came from Morgan Stanley Capital International. T-bill returns are from CRSP.

Note: Specification: $R(t+1) - r = B^*x(t) + e(t+1)$.

[a]An asterisk (underlined coefficient) indicates significance at the 5 (10) percent level.

It is possible to design the set of constraints of the model in several ways. In principle, the best way to test the model would be to let the constraints be $b_{ij} = \gamma s_{ij}$. Since we do not know the coefficient of risk aversion, this constraint cannot be tested without assigning an ad hoc value for γ. Alternatively, the constraint can be expressed as b_{ij}/s_{ij}, equal for all i, j. Engel and Rodrigues (1992) argue, based on results in Gregory and Veall (1985), that tests based on products rather than tests based on quotients result in more power. We follow their suggestion and specify the constraints to be of the form $b_{ij}s_{kl} = b_{kl}s_{ij}$, for all i, j. This leaves us with the problem of choosing the benchmark, k, l. We use $b_{jap,\,jap}$ and $s_{jap,\,jap}$, since both these estimated coefficients are significantly different from zero.

The log-likelihood value for the unrestricted system is 307.67. When the twenty-four constraints implied by the model are imposed, the resulting value of the log likelihood is 284.18. Our results give the LR statistic a value of 46.99, which for a $\chi^2(24)$ has a p-value of 0.003. The data thus strongly reject the null hypothesis that U.S. investors follow the CAPM in their portfolio allocation. Another way of interpreting the result is that the U.S. equity investment portfolio is not mean-variance efficient.

To check the robustness of our result, we grouped countries into regions. First, we aggregated Germany and the United Kingdom into "Europe." This should reduce the problem of erroneously classifying trading in German securities which takes place in London as transactions in U.K. shares. Combining our new European aggregate with Canada, Japan, and the United States implies a four-by-four system. Market-capitalization-weighted return series were generated for Europe, and the U.S. investment position in Germany was added to the fraction of wealth allocated to the U.K. market. To conserve space, we do not report the estimated coefficients. The only significant parameters are in the equation for excess returns on the Japanese market; the coefficient on the Europe weight is significantly negative, and the coefficient on the Japan weight is significantly positive at 5 percent. The resulting LR statistic was 33.43, which for a $\chi^2(15)$ has a p-value of 0.004. Finally, we also considered North America (Canada and the United States) as one region. If Canadian residents are in fact conducting many of their transactions in New York, it may be that little information is lost in the aggregation. Again, to conserve space, the estimated coefficients of the resulting three-by-three system are not reported. All three coefficients in the equation for excess returns in Japan are significant, but none of the other estimated parameters are significant. The LR statistic was in this case 26.52, which for a $\chi^2(8)$ has a p-value of 0.001.

The null hypothesis that U.S. investors follow the simple CAPM in allocating their investment portfolio is thus strongly rejected by the data. Even when we try to reduce potential reporting problems by aggregating markets into regions, we still strongly reject. Engel and Rodrigues (1992) were not able to reject that the market-capitalization-weighted portfolio was mean-variance efficient using monthly data on market capitalizations and excess returns from ten countries. Beyond the differences in data frequency and sample countries,

a possible explanation for our stronger result is that we study the investment behavior of one particular group of investors, whereas Engel and Rodrigues capture the behavior of the marginal investor in each market, wherever that investor may reside.

4.8 Conclusion

In this paper we examine cross-border equity flows in Canada, Germany, Japan, the United Kingdom, and the United States. To our knowledge, this is among the first studies to combine information about the return to equity investment with the actual portfolio allocations of international investors. In many respects, our results are negative. Observed adjustments in international portfolios are not consistent with the first-order conditions of the CAPM. Neither do investors across countries seem to behave in unison; country- and investor-specific factors seem to play an important role in portfolio allocations. Net equity flows to and from the United Kingdom account for the majority of all flows across U.S. borders. Flows to and from the United Kingdom account for most of the flows across Canadian borders. Finally, U.S. residents appear to churn their holdings of foreign assets, while the turnover rate on foreign holdings of U.S. equities is more closely in line with the average turnover rate on the U.S. market. We conclude that there is a considerable amount of heterogeneity in international investment behavior.

The data strongly reject that U.S. investors' portfolios are mean-variance efficient. Previous studies have had only limited success in rejecting the CAPM based on international data. This highlights the difference between the norm in the finance literature, which involves basing tests solely on relationships among rates of return as opposed to testing the actual portfolio-allocation strategies of investors. When trying to understand international portfolio choice, research should focus on combining the price data with the actual portfolio investment made by international investors. To facilitate this task, it is imperative that researchers obtain more detailed data on international securities transactions.

One possible explanation for our failure to confirm even the most basic predictions of simple models of portfolio choice is that cross-border equity flows are underreported to official agencies, and therefore our data are not representative of investor behavior. This may indeed be the case; however, equity investment by the countries included in our sample now accounts for over 10 percent of all transactions on U.S. stock exchanges. If these data are to be considered suspect, one has to question the validity of any analysis using balance of payments data. It is possible that reporting problems make it difficult to find linkages between returns and portfolio allocations. Given that the results are robust to aggregating across regions, which should reduce such problems, the evidence seems more convincing.

Another possibility is that existing models of portfolio allocation can be thought of as descriptions of "mature" investors making marginal changes in

an already well-diversified portfolio. As of the 1990s, national portfolios remained strongly biased toward domestic securities. The problem facing investors is how to move their existing holding of equity toward a better diversified portfolio, while still remaining sensitive to high-frequency changes in returns. Thus, our research points to the need for new models of portfolio choice which can explain the dynamics of portfolio adjustment.

Appendix A
U.S. Reporting of International Securities Transactions

Each month, all transactions between U.S. and foreign residents in long-term marketable securities must be recorded on a form ("International Capital Form S") which is then filed with the Treasury Department. Reporting is required by law for "all banks, other depository institutions . . . , International Banking Facilities (IBFs), bank holding companies, brokers, dealers, nonbanking enterprises or other persons in the United States . . . , who on their own behalf, or on behalf of customers, engage in transaction in long-term securities DIRECTLY with foreigners" (Treasury Department 1991, 1). Reports are also required by brokers and institutions who intermediate transactions between a domestic client (private investors or another broker or dealer) and a foreigner. A foreigner is any individual, partnership, association, corporation, or other organization located outside the United States. Under these guidelines, branches of American brokers and dealers located in foreign countries are considered foreigners. Exemption from reporting is granted when the grand total of purchases *or* sales of all long-term securities falls below $2 million during the reporting month.

The definition of long-term marketable securities includes public and private issues of debt and equity with maturity of more than one year from date of issue. It includes "common and preferred stocks or investment company shares, rights, scrip, bonds, debentures, Floating Rate Notes (FRNs), Continually-Offered Medium Term Notes, Collateralized Mortgage Obligations (CMOs), zero-coupon bonds and notes, equipment trust certificates and similar long-term marketable corporate debt instruments issued by entities located in the United States or in a foreign country; marketable long-term debt obligations of the U.S. Treasury, Federal Financing Bank, United States Government–owned corporations, and Federally-sponsored agencies; and marketable long-term obligations of state and local government or of governments of foreign countries, including any agencies, corporations, financial institutions, or other instrumentalities thereof." It also includes "American Depository Receipts (ADRs), when issued by, or surrendered to, Depositories of ADRs; options and warrants to purchase and/or sell long-term securities and certificates or receipts representing an interest in particular coupon or principal payments of marketable U.S. Treasury securities" (Treasury Department 1991, 4). Re-

ports cover new security issues, direct placements, and securities issued under Shelf Registration provisions. The rule is that the geographic *location* of the issuing entity determines the classification of a security as domestic or foreign. Thus, equity issued by a U.S. subsidiary (branch or agency) of a foreign-based firm is considered domestic equity.

Transactions with foreigners in options and warrants should be reported regardless of the maturity of the option and warrant (Treasury Department 1991, 4). When options and warrants are issued by an entity other than the issuer of the underlying security, the option and warrant is classified according to the location of its own issuer. Form S gives the following example: "A dealer located in New York writes put/call warrants on a British stock, e.g., British Telecom, and sells the warrants to foreigners. The sale of the warrants should be reported as purchases by foreigners of a domestic corporate bond. At the time the warrants are exercised, the transactions would be recorded as a purchase/sale, as appropriate, of foreign stock to which the warrants applied" (Treasury Department 1991, 5). Options and warrants are bundled with the underlying class of securities, that is, corporate equity, corporate bonds, marketable Treasury and Federal Financing Bank bonds and notes, and bonds of U.S. government corporations and federally sponsored agencies in the aggregated data.

Appendix B
Calculating Robust Standard Errors of Covariances

Although our sample is rather short, we rely on asymptotic theory to derive the formula for robust standard errors of covariances. If x_t and y_t denote the demeaned time series, and we define z_t to be the product of these series, $x_t y_t$, then

$$\sqrt{T}\left[\frac{1}{T}\sum_{t=1}^{T} z_t\right] \to N(E_t(x_t y_t),\ V), \tag{6}$$

where $V = \lim_{T\to\infty} \mathrm{Var}(\frac{1}{\sqrt{T}}\sum_{t=1}^{T} z_t)$. We estimate V as

$$\hat{V}_T = \frac{1}{T}\sum_{t=1}^{T}\left((z_t - \bar{z}_T)^2 + 2\sum_{l=1}^{k(l)} W_T(l)(z_t - \bar{z}_T)(z_{t-l} - \bar{z}_T)\right), \tag{7}$$

where $\bar{z}_T \equiv \frac{1}{T}\sum_{t=1}^{T} z_t$, $k(l)$ is of order $T^{1/4}$, and $W_T(l) = [1 - l/(T+1)]$. Our time series have fifty-five observations, and we use six lags in estimating $\hat{V}$ ($2 \cdot (55)^{1/4}$). Under the null that the series are uncorrelated, $\bar{z}_T \equiv 0$. We thus set this to zero in the formula for calculating $\hat{V}$. The random variable $[\sqrt{T}c\hat{o}v/\sqrt{\hat{V}}]$ has

a standard normal distribution, $N(0,1)$, under the null hypothesis. The reported marginal significance levels refer to this distribution.

References

Adler, M., and B. Dumas. 1983. International portfolio choice and corporation finance: A synthesis. *Journal of Finance* 38:925–84.

Cooper, I. A., and E. Kaplanis. 1994. Home bias in equity portfolios, inflation hedging and international capital market equilibrium. *Review of Financial Studies* 7, no. 1:45–60.

Dumas, B. 1993. Partial equilibrium vs. general-equilibrium models of international capital market equilibrium. Working Paper no. 93–1. Wharton School, University of Pennsylvania.

Dumas, B., and B. Solnik. 1992. The world price of exchange rate risk. Working paper, HEC School of Management, France.

Engel, C. M., and A. P. Rodrigues. 1989. Tests of international CAPM with time-varying covariances. *Journal of Applied Econometrics* 4:119–38.

———. 1992. Tests of mean-variance efficiency of international equity markets. Working paper, University of Chicago.

Ferson, W. E., and C. R. Harvey. 1991. The risk and predictability of international equity returns. Working paper, University of Chicago.

Frankel, J. 1982. In search of the exchange risk premium: A six-currency test assuming mean-variance optimization. *Journal of International Money and Finance* 1:255–74.

French, K., and J. Poterba. 1991. Investor diversification and international equity markets. *The American Economic Review* 81:222–26.

Froot, K. A., and J. C. Stein. 1991. Exchange rates and foreign direct investment: An imperfect capital markets approach. *The Quarterly Journal of Economics*, November, 1191–1217.

Gregory, A., and M. Veall. 1985. Formulating Wald tests of nonlinear restrictions. *Econometrica* 6:1465–68.

Grubel, H. G. 1968. Internationally diversified portfolios. *The American Economic Review* 58:1299–1314.

Harvey, C. R. 1991. The world price of covariance risk. *The Journal of Finance* 41:111–57.

———. 1993. Predictable risk and returns in emerging markets. Working paper, Duke University.

Heston, S. L., K. G. Rouwenhorst, and R. E. Wessels. 1992. The structure of international stock returns. Working paper, Yale University.

Korajczyk, R. A., and C. J. Viallet. 1989. An empirical investigation of international asset pricing. *The Review of Financial Studies* 2:553–85.

Levy, H., and M. Sarnat. 1970. International diversification of investment portfolios. *The American Economic Review* 50:668–75.

Merton, R. E. 1973. An intertemporal capital asset pricing model. *Econometrica* 41:867–87.

Newey, W., and K. West. 1987. A simple positive semi-definite heteroscedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55:703–8.

Riddle, J. 1992. Controls on international securities transactions. Working paper, University of California, Santa Barbara.

Solnik, B. H. 1974. Why not diversify internationally rather than domestically? *Financial Analysts Journal* 30:91–135.

Stekler, L., and E. M. Truman. 1992. The adequacy of the data on U.S. international financial transactions: A Federal Reserve perspective. International Finance Discussion Paper no. 430. Board of Governors of the Federal Reserve System.
Tesar, L. L., and I. M. Werner. 1992. Home bias and the globalization of securities markets. NBER Working Paper no. 4218. Cambridge, Mass.: National Bureau of Economic Research.
———. 1994a. Home bias and high turnover. *Journal of International Money and Finance*, forthcoming.
———. 1994b. U.S. equity investment in emerging stock markets. *World Bank Economic Review*, forthcoming.
Treasury Department. Office of the Assistant Secretary for Economic Policy. 1991. *Instructions for preparation of monthly form S, international capital form S.* OMB no. 1505–0001. Washington, D.C.
Wheatley, S. 1988. Some tests of international equity integration. *The Journal of Finan-*

Comment

Philippe Jorion

The main contribution of the Tesar-Werner paper is the detailed analysis of a data base of foreign investment positions hitherto ignored by academics. The data analysis confirms that domestic investors hold a disproportionately small amount of foreign investment, and provides useful evidence of changing patterns of international investments.

The Home-Bias Puzzle

The foreign portfolio positions reported in the Tesar-Werner paper can be compared to the foreign investment position (FPI) of pension funds all over the world. These positions, presented in table 4C.1 and taken from Adler and Jorion (1992), cover more countries than the Tesar-Werner study, but are restricted to one class of institutional investors.

The striking feature of this table is the low proportion generally invested in foreign assets. In the United States, for instance, pension funds have invested only 4 percent of their assets abroad. A second feature of the table is that the foreign portfolio investment ratios are growing rapidly for all countries, except for Canada, where pension funds are subject to a 10 percent foreign asset limit that is currently binding.

To put these FPI ratios in perspective, market capitalization ratios are reported in table 4C.2. In terms of market capitalization, nondollar stocks and bonds account for 66.7 percent and 57.5 percent, respectively, of the world market in 1990. The portfolios of U.S. pension funds, therefore, are much closer to purely domestic portfolios than to capitalization-weighted world indices.

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Table 4C.1 **Foreign Investment by Pension Funds (percentage of assets invested abroad)**

Country	1980	1985	1990
Canada	7	7	8
France	1	2	5
Germany	2	3	5
Japan	1	4	8
Netherlands	4	6	11
United Kingdom	9	15	26
United States	1	2	4
Total	2	4	8
($ billion)	19	95	347

Source: InterSec Research, Stamford, Connecticut. Pension fund data include public and private funds.

Table 4C.2 **Size of Major Stock and Bond Markets (percentage of total world market capitalization)**

	Stocks			Bonds		
Country	1980	1985	1990	1980	1985	1990
Canada	4.7	3.6	2.6	3.2	2.1	2.3
France	2.2	1.9	3.5	4.0	2.9	4.2
Germany	2.9	4.4	4.0	10.3	6.4	7.0
Japan	14.7	22.5	33.2	20.1	17.5	18.1
Netherlands	1.0	1.3	1.4	1.4	1.0	1.3
United Kingdom	7.8	8.1	10.4	7.8	3.2	2.1
United States	56.8	48.4	33.3	29.5	46.8	42.5
Other	9.9	9.7	11.5	23.7	20.1	22.5
Total size ($ billion)	2430	4039	8444	2706	5933	10368

Source: Morgan Stanley Capital International for stock market data; Ibbotson and Associates for 1980 bond market data; Salomon Brothers for 1985, 1990 bond market data.

Therefore, the actual proportions invested in foreign assets appear to be much lower than the proportions implied by either market capitalization or import penetration. These results are confirmed by the analysis of Tesar and Werner, using a more comprehensive data set collected by U.S., Canadian, and German governments, and covering all capital flows into long-term securities.

Net Equity Flows

While the authors do a commendable job of describing the data, the paper provides little theoretical guidance as to how flows should change over time.

This, however, is more a reflection of the present state of finance models that focus almost exclusively on price, or rather rates, of returns, rather than on transaction volumes. As a result, there is little theory to draw from.

In the absence of theoretical models that explain capital flows, two competing explanations are given for correlations between capital flows:

1. If flows are driven by homogeneous expectations, we should expect *negative correlations* between capital flows. This corresponds, for instance to a situation where both U.S. and Japanese investors think the U.S. stock market will outperform the Japanese market and, as a result, Japanese investors buy U.S. stocks, and U.S. investors simultaneously sell Japanese stocks.
2. If flows are driven by diversification motives, we should expect *positive correlations* between capital flows. This corresponds, for instance, to situations where both U.S. and Japanese investors invest in each other's market.

Let me offer, however, two words of caution about empirical tests. First, these flows are highly autocorrelated. As a result, rejections of the hypothesis of zero correlations are misleading, because they assume independent observations, which is not the case. Second, it should be recognized that these flows are constrained by balance of payment considerations. When the United States runs a large balance of trade (BT), or current account, deficit with Japan, this *must* be balanced by a capital account surplus. Financing can occur through portfolio inflows into bank accounts, bonds, or stocks, through direct investment, or through government intervention. While there is no indication of which account will be affected, we know that the net of all capital inflows into the United States must be positive. This would be consistent, for instance, with a situation where Japanese investors buy U.S. stocks and U.S. investors sell foreign stocks, which translates into a *negative correlation.* Therefore, BT deficits may imply negative correlations between capital flows. While the balance of payment only constrains flows netted across assets and countries, certain patterns are clearly ruled out.

Indeed, this is what we observe in the data. Over 1988–91, the United States had an average BT deficit of $50 billion, $10 billion, and $10 billion with Japan, Germany, and Canada, respectively, and a small BT surplus of $3 billion with the United Kingdom. Correlations of flows with these respective countries appear to be perfectly in line with the sign of the BT. This is not to say that the sign of correlations are uniquely determined by balance of payment data, but rather serves as a reminder that aggregate flow data do impose constraints on the patterns of capital flows.

Gross Equity Flows

In this section, the authors remark that gross equity flows, which consist of the total of purchases and sales, seem to have increased over time. This, however, cannot be interpreted as a sign of increased turnover, since the paper subsequently shows that the total foreign investment position of U.S. investors has increased over time. Turnover is usually associated with transactions as a proportion of assets, and could actually be constant over time.

Another puzzling statement is the assertion that variable trading costs cannot explain home-country bias because the volume of trading has increased over time. It is not clear how variable transaction costs, in one shape or another, can have anything to do with home-country bias, since they affect domestic and foreign investors in a symmetric fashion. If home bias is to be explained at all, it must be related to asymmetries in international capital markets, such as exchange risk, capital restrictions, or asymmetric information.

Asset-Pricing Tests

The last part of the paper claims to test an asset-pricing model and to find stronger results than previous research. The methodology consists of estimating an unrestricted model

$$r_t = Bx_t + \varepsilon_t, \tag{1}$$

where r_t represents a vector of excess returns, and x_t is a vector of asset shares. If the standard capital asset pricing model (CAPM) holds, we can write

$$r_t = \rho\Omega x_t + \varepsilon_t, \tag{2}$$

where ρ represents the constant relative risk aversion, and Ω is precisely the variance-covariance matrix of the error terms $V(\varepsilon_t)$. Following Frankel 1982, the authors test the restriction that

$$B = \rho\Omega. \tag{3}$$

The methodology is by now standard, and has been extended to time-varying second moments by Giovannini and Jorion (1989), among others.

Two major points should be made here. First is the interpretation of the tests. The authors take x_t as the vector of U.S. investment positions. As a result, the tests should properly be interpreted as tests of the mean-variance efficiency of the portfolio of a representative U.S. investor, *not* as a test of the CAPM. Testing the CAPM involves setting the weights to those of the world market portfolio, if all investors display logarithmic utility function, or to those of a market portfolio optimally hedged against currency risk, in the more general case. The tests presented here can be viewed as a measure of the mean-variance inefficiency of U.S. investments, or of the performance loss due to insufficient international diversification. The conclusion that stronger tests of the CAPM can be achieved using actual positions hardly seems justified.

A second point concerns the statistical tests. The restrictions imposed by the model can be tested by maximum likelihood, for instance, by comparing the values of the maximized likelihood functions with and without the restrictions. Alternatively, an LM test or a Wald test can be used. The authors test the constraint that $b_{ij}\omega_{kl} = b_{kl}\omega_{ij}$, where ω_{ij} are assumed known. This raises a number of issues. First, the elements of the variance-covariance matrix Ω are measured with error, which should be reflected in the test statistic. Second, the chi-square test is only valid asymptotically. In practice, it will reject too often in small samples, which is the case here since the experiment involves only fifty-five

quarters and twenty-five parameters. To give an idea of the bias, consider the bias arising from approximating an F distribution by a chi-square distribution. The 5 percent critical value for a $\chi^2(24)$ is 36.41, which, when evaluated relative to an $F(24,20)$ distribution, has a marginal significance level of only 17 percent. Thus with a statistic sample value slightly above 36.41, one would conclude that the hypothesis of interest is rejected, whereas rejection would not occur with the more appropriate distribution.

Therefore, it is highly unlikely that this test of the mean-variance efficiency can lead to credible rejections. Tests involving stock prices and based on unconditional moments, as in Harvey (1991), have seldom rejected any hypothesis of interest in previous research. These results could be ascribed to the low power resulting from high stock return volatility, and are the reason why researchers have turned to more informative tests based on time-varying moments.

Conclusions

This paper makes an interesting contribution to the growing literature on international investments by attracting the attention of researchers to a potentially useful data base of U.S. and foreign investment positions. While I applaud the attempt to shed light on the home-bias puzzle, the empirical tests in the latter part of the paper can be criticized on several grounds. Empirical tests of the mean-variance efficiency of stock portfolios are likely to be uninformative unless complemented by conditioning information.

Finally, the paper takes an empirical approach to the data because of the lack of theoretical guidance as to what should drive transaction volume in financial markets. This clearly shows an important gap in finance theory, and points to the need for future theoretical work in this direction. In general, volume can be driven by investors' disagreement about expected returns. Alternatively, another view is that international capital flows are primarily responding to changes in capital restrictions, and are slowly building up after the effective removal of investment barriers in the late 1980s.

References

Adler, M., and P. Jorion. 1992. Foreign portfolio investment. In *The new Palgrave dictionary of money and finance,* eds. P. Newman, M. Milgate, and J. Eatwell. London: Macmillan.

Frankel, J. 1982. In search of the exchange risk premium: A six-currency test assuming mean-variance optimization. *Journal of International Money and Finance* 1:255–74.

Giovannini, A., and P. Jorion. 1989. The time-variation of risk and return in the foreign exchange and stock markets. *Journal of Finance* 44:307–25.

Harvey, C. 1991. The world price of covariance risk. *Journal of Finance* 46:111–57.

Comment

Richard Levich

Text

In his 1968 paper, Herbert Grubel verified an empirical regularity that most economists would have confidently predicted: that the correlation of equity market returns across countries is less than unity and sometimes substantially so. These results implied that investors had strong incentives to hold diversified international stock portfolios. Yet they do not diversify fully, in fact. Thus Grubel's analysis fit comfortably into a common problem in financial model building—a stylized model of economic behavior producing results at variance with the behavior of real-world economic agents. For the past several years, economists have attempted to reconcile the predictions of the stylized international portfolio choice models, and the observed tendency of investors to hold portfolios biased toward domestic securities.[1] The paper by Tesar and Werner hopes to add to our understanding of investor choices by analyzing a new set of data on international capital *flows* among several countries: the United States, Canada, Germany, Japan, and the United Kingdom.

Any prospective reader of a paper with this title might suspect that this task of linking information about capital *flows* to models of *stock* allocation of assets would be difficult. The authors are aware of these difficulties. They themselves raise several caveats suggesting that the researcher must proceed carefully with accurately measured data.

I admire the authors for uncovering a new data base assembled from U.S. Treasury, Bank of Canada, and Bundesbank sources, and subjecting it to a thorough and creative data analysis. However, in the end I retain doubts that this new data base is sufficient to permit valid inferences (let alone conclusions) on investor portfolio choices—their adjustment over time or their stock allocation at a point in time. I am still more pessimistic, feeling that any method—short of directly surveying individual investors (not institutions)—will be unsuccessful in gauging the nature of international portfolio allocations at the level of specificity our stylized models require.

My comments focus on the first three sections of the paper. My major theme is to underscore the apprehension that readers should harbor with respect to research on international capital flows and portfolio allocations. But I will also try to offer constructive advice on how this new data base and related data might be used to analyze various aspects of international portfolio choice models.

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1. See Uppal (1992) for a survey of this research. Uppal argues that several plausible explanations—a desire to hedge domestic inflation, prevailing institutional barriers to foreign investment, and discriminatory tax treatment on income from foreign versus domestic assets—are not sufficient to resolve the findings of a home-country bias.

Data Description

In section 4.2 of their paper, Tesar and Werner acknowledge that there are some shortcomings of their data, and they discuss several of them. But other potentially serious problems may remain. Consider the case of Fidelity Investments, headquartered in Boston, Massachusetts, which has just received a $1 million purchase in its open-end Europe Fund.

To begin, the documentation of the U.S. Treasury data base (on which the authors base much of their analysis) explains that it covers "DIRECT transactions" between residents of two countries.[2] Is it the implication that "INDIRECT" transactions are not covered? In particular, suppose Fidelity Investments transfers the $1 million via the foreign exchange market to a bank account in London, an action recorded in the balance of payments as a short-term capital flow. Days later, Fidelity's affiliate in London (a British entity) buys shares on the London exchange—a transaction between two British residents, entered neither in the balance of payments nor in the U.S. Treasury's data base. For various reasons (market liquidity, depth, legal restrictions on removing physical shares from the country) most institutional investors hold the true equity shares in the native country rather than in American Depository Receipts (ADRs) in the United States. If coverage for these transactions is lacking, the U.S. Treasury data could be quite misleading. In note 6, the authors refer to a procedural change in 1992 intended to address this problem. But data prior to 1992 could reflect substantial undercoverage of cross-border equity investments.[3]

Continuing to follow this $1 million cross-border flow, our natural inclination is to classify the shares purchased in London as those of a U.K. firm. But the shares could easily be those of a German, French, or Italian firm. The authors' data sources identify London as the location of the *market,* not of the identity of the headquarters from which the shares were purchased. This uncertainty in identifying the portfolio allocation by country is particularly a problem for cross-border flows to London where shares of many non-British firms are traded. And even if the shares are those of a U.K. firm, it could very likely be a multinational corporation, with few revenues and productive operations in the United Kingdom itself.[4]

Finally, the presentation of the data inclines us to believe that the *owner* of the shares in Fidelity's Europe Fund is American, but this need not be the case. He could be French (Bernard Dumas), Swedish (Ingrid Werner), Swiss (René

2. Uppercase letters as in original U.S. Treasury documents.

3. The authors discuss that if Fidelity Boston buys ADR shares from an American, this is *not covered* in the U.S. Treasury data base. This does not impact their estimates of global portfolio allocations, but it biases downward their estimate of trading volume in foreign securities.

4. There is also the further implicit assumption that London is the "dominant" market for the trading and pricing of these shares. But in some cases (e.g., Sony, Telephonos de Mexico, Royal Dutch Petroleum) it is claimed that the market in the domestic headquarters country is really a satellite market, with the bulk of trading and price determination taking place elsewhere.

Stulz), or a person of some other nationality and prospective cash flow pattern who happens to use Fidelity Boston as his or her investment intermediary. This is particularly a problem for data on capital flows emanating from London and Switzerland, where it is well-known that investment funds from around the world have been managed for centuries. For example, Baring Securities reports that over one-half of all foreign equity investments are held in Swiss and U.K. portfolios.[5] Does this reflect closer adherence by Swiss and British investors to models of international portfolio choice, or their niche activity (investment funds management) within the financial services industry? While the former could be true, the data undoubtedly reflect the latter effect as well.

Net Equity Flows: Cross Border

Assuming that the raw data are meaningful, the analysis of cross-border equity flows is interesting, offering us a varied pattern of behaviors rich in interpretation. But as the authors acknowledge—this is part of the problem. Because any pattern of time-series correlation and cross-country correlation is conceivable and rational, the data are fundamentally descriptive. The authors take their results to suggest that heterogeneous motives or allocation rules may be guiding investors in different countries. However, even this interpretation, I feel, can be challenged.

International portfolio transactions can reflect either stock adjustments or flow adjustments, each taken in response to a particular portfolio optimization decision framework. Stock adjustments represent transactions to rebalance long-term equilibrium portfolio allocations. These could stem from the sudden lifting of investment barriers or one-time, permanent changes in investor wealth, appetite for risk taking, assessment of country risk, and so forth. Despite assumptions in portfolio-balance models, these portfolios adjustments *cannot* be made instantaneously. Take, for example, the windfall earned by oil-exporting countries in the 1970s. Initially, OPEC investors behaved conservatively with investments in short-term deposits and government securities. Only gradually did the investment mix change to include longer-term portfolio and direct investments.[6]

Flow adjustments, on the other hand, may result from a permanent change in the domestic savings rate, the growth of domestic real income, or the growth rate of foreign market capitalization. Each of these factors could lead to a higher volume of cross-border investment flows to keep portfolio allocations at their target proportion.

Dividing cross-border portfolio transactions between stock and flow adjustments may be a convenient way to organize our thinking about the data, but we should not overlook the possibility that asset-demand functions (the portfolio

5. Baring Securities (1992), 69.

6. Lifting the investment sterling restriction in 1979 appears to be reflected in the U.K. series, but the gradual Japanese liberalization of foreign investments in the 1980s does not.

optimization objective) might be subject to change. Our stylized models rely on the presumption that investors are following a single portfolio optimization rule in an integrated world capital market. But global investors are more likely seeking some mixture of (a) expected value gains associated with market segmentation and the fact that some markets have a limited following or some barriers to investment, and (b) portfolio diversification gains associated with markets that have imperfect correlation.

I have two main concerns here. One is that the flow data of the U.S. Treasury mixes both stock and flow adjustments. The authors' tests of the determinants of cross-border flows focus primarily on the flow determinants. However, because foreign stocks are so underrepresented in U.S. portfolios, there is a presumption that a large stock adjustment is taking place. My second concern is that while our models of international asset allocation are based on *individual's* portfolios, foreign transactions are dominated by *institutions.* Institutional managers have their own performance evaluation criteria and objectives that may not coincide with uniform portfolio allocation rules deemed optimal for individuals. This is not necessarily bad since individuals can reach their own investment objectives by offsetting or supplementing positions taken by institutional managers.

Gross Cross-Border Training

This section and the remainder of the paper rely on U.S. Treasury data only. The rationale for examining gross cross-border trading is not made completely clear, although it seems directed at supporting the notion that foreign trading is inexpensive, and therefore not responsible for the home-country bias in portfolios. As suggested earlier, the data may not be fully up to this task. What if Fidelity Investments buys and sells securities actively in London on behalf of American investors? These ultimately represent foreign trading activity, but may not be reflected in the U.S. Treasury data.

In one sense the authors' result—that gross turnover in foreign equities is large relative to U.S. domestic trading—is not surprising. We suspect that foreign trading is dominated by institutions and that institutions trade roughly four times as much as individuals in the U.S. domestic market.[7] Other estimates from Baring Securities on gross turnover (measured as trading volume relative to the market value of shares held) place foreign turnover activity at 2.29 (in 1991, all countries) compared with 0.81 in domestic turnover.[8]

It is worth noting the tremendous cross-sectional variation in turnover when measured by trading volume as a percentage of a market capitalization.[9] At the low end of the turnover statistics, we find Chile (6.0 percent), Brazil (6.1 per-

7. New York Stock Exchange data report that institutions and individuals each own roughly 50 percent of U.S. securities. However, institutions account for 80 percent of trading volume versus 20 percent for individuals.

8. Baring Securities (1992), 67.

9. These statistics reflect trading in 1990. See Goldman Sachs (1991), 17.

cent), Philippines (8.1 percent), and Mexico (8.8 percent). At the high end are Taiwan (709.6 percent), Thailand (102.2 percent), Germany (92.1 percent), and Switzerland (73.7 percent). For the sake of comparison, U.S. turnover in 1990 was 49.2 percent of market capitalization. The wide variation in turnover gives foundation to the adage "Global investors 'trade' in mature markets and invest in developing markets."

While implying nothing about causality, a significant relationship can be measured between the volatility of stock returns and the percentage of foreign trading activity in the market.[10] With no foreign activity, price volatility is measured at 12 percent per annum. Each 1 percent additional foreign trading implies 0.35 percent additional price volatility. The Netherlands stock market is at one extreme with roughly 85 percent of trading volume attributable to foreign activity. The United States is at the other extreme, with only 10 percent of trading activity attributable to foreigners.

What Drives U.S. Net Equity Flows?

The exploratory analysis in this section of the paper is interesting. One problem referred to earlier is the reliance on flow variables rather than stock adjustment variables. Along these lines, a variable related to the onset of global offerings could be useful. This might include the volume of foreign initial public offerings, or a measure of foreign privatization issues. An additional flow variable that might be tried is a country sentiment index derived from the pricing of closed-end country funds.

Conclusions

The authors have developed a new data base with the potential to examine three distinct issues in international investment models: (a) identify the nationality of investors in cross-border investment, (b) identify the country-specific determinants of portfolio choices, and (c) examine the actual portfolio choices of investors rather than imposing market clearing conditions that may be ad hoc or wrong. Regarding the first two issues, the limitations of the data base are such that all we know for certain is that a transaction between country x and country y occurred. We are not certain that the investor resides in or consumes in country x or that the firm is headquartered or does business in country y. Moreover, we are not certain that the data coverage includes portfolio transactions that take place within the foreign country after a short-term international money market transaction. Thus the possibilities for learning about these two issues appear doubtful.

As for the third area of exploration, the authors' attempt to examine actual portfolio choices deserves high praise. Too often we have been offered a method of international portfolio allocations that logically cannot satisfy a market clearing condition. For example, looking only at the correlation of re-

10. These calculations are from Baring Securities (1992), 70.

turns in the 1960s and 1970s would have led us to weight heavily on small markets largely uncorrelated with the U.S. index, or segmented markets that offered unusually high returns. Logically, the world cannot invest a large share in countries that are small or countries that erect substantial barriers to foreign investment. However, a naive, passive weighting system, such as weighting according to gross domestic product (GDP) shares also has its flaws. All countries do not have equity market capitalizations in proportion to their GDP weights. Even an international allocation system based on market capitalization has its difficulties. Many countries restrict market ownership by foreigners, and market capitalization may be a noisy measure of size because of the cross-holding effect.[11]

Investor allocation of investments across countries very likely reflects a complicated trade-off involving numerous factors. Investors typically feel that a country must pass a critical threshold with respect to capital controls, clearing and settlement procedures, auditing standards, accounting transparency, and so forth before the *ability* to invest translates into a *willingness* to invest. Fixed set-up costs for an equity research unit and funds manager and due diligence costs imply that a market must reach a critical size before "coverage" of the market beings. As a practical matter, that means that many of the world's smaller markets are omitted.[12] The International Finance Corporation, which began its *Emerging Stock Markets Factbook* and data base in only 1987, is a good case example.

An alternative approach to measuring portfolio allocation would put greater emphasis on surveys of individual investors. The data show that in the United States, the top one hundred pension funds hold about 10 percent of their funds in foreign assets while individuals hold directly only 2 percent in foreign assets. These may be better estimates of actual positions than those derived from Treasury or balance of payments data, although they are still subject to their own estimation problems.

References

Baring Securities. 1992. *Cross-border capital flows: 1991/92 review.* London: Baring Securities.

Choi, Frederick D. S., and Richard M. Levich. 1990. *The capital market effects of international accounting diversity.* Homewood, Ill.: Dow Jones-Irwin.

French, Kenneth, and James Poterba. 1989. Are Japanese stock prices too high? NBER Summer Institute, August. Manuscript.

Goldman Sachs International Limited. 1991. *Anatomy of world markets.* London: Goldman Sachs International Limited.

11. If firm A owns x percent of the shares of firm B, the market values of A + B overstate the amount of capital needed to buy both firms by the fraction (x percent) of B's value. The overstatement is amplified when B also owns an interest in A. Cross-holding along these lines is significant in Germany and Japan. See French and Poterba (1989).

12. See Choi and Levich (1990) for further discussion of the international investment process.

Grubel, Herbert G. 1968. Internationally diversified portfolios: Welfare gains and capital flows. *American Economic Review* 58:1299–1314.

International Finance Corporation (IFC). 1987. *Emerging markets factbook.* Washington, D.C.: International Finance Corporation.

Uppal, Raman. 1992. The economic determinants of the home country bias in investors' portfolios: A survey. *Journal of International Financial Management and Accounting,* no. 3 (autumn): 171–89.